

ABSTRACT OF THE DISCLOSURE

The quantum semiconductor device comprises a first semiconductor layer 18 on a substrate 10 with a two-dimensional carrier gas formed in; a quantum dot 20 formed on the first semiconductor layer 18; a second semiconductor layer 22 formed on the first semiconductor layer 18, covering the quantum dot 20; a dot-shaped structure 24 formed on the surface of the second semiconductor layer 22 at the position above the quantum dot 20; and an oxide layer 26a, 26b formed on the surface of the second semiconductor layer 22 on both sides of the dot-shaped structure 24. The crystal strains generated in the surface of the semiconductor layer 22 due to the presence of the quantum dot 20 causes the dot-shaped structure 24 to grow on the semiconductor layer 22 surface at the position which is accurately above the quantum dot 20. This permits the oxide layer 26a, 26b to be formed with the dot-shaped structure 24 as a mark, and the source/drain regions 30a, 30b can be formed with the oxide layer 26a, 26b as a mark. Thus, even in a case that the self-assembled fine quantum dot 20 is buried in the semiconductor layer 22, the quantum semiconductor device can be formed without failure.